

Lindsay Creek Monitoring Program 2001-2002

A Water Quality Sampling Project for Lindsay Creek and its Tributaries

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Developed for: **Nez Perce Soil Conservation District
Idaho State Department of Agriculture**

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Approved by: _____
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Introduction:

Lindsay Creek is a small watershed with 7.35 stream miles flowing northeast through dryland agriculture and the eastern urban area of the city of Lewiston. Small residences dot the watershed providing a sub-urban aspect to the drainage. Lindsay Creek is listed on the Idaho 303(d) list for bacteria, dissolved oxygen, nutrients, sediment, temperature, habitat alterations, and flow alteration. The TMDL for Lindsay Creek is due 2003. This monitoring program will collect data to address bacteria, dissolved oxygen, nutrients, sediment, temperature and concerns surrounding these water quality parameters.

Monitoring Program:

This monitoring program is intended to provide background data on Lindsay Creek. Determining where loads are entering the stream will allow prioritization for the implementation of Best Management Practices (BMPs) on a subwatershed scale.

Monitoring of Lindsay Creek in accordance with this plan, will be conducted in agricultural and urban settings. Parameters being monitored will provide information to determine the priority portions of the watershed with regards to sources of sedimentation, nutrient loading, temperature loading, dissolved oxygen, and pathogens. Specific parameters are: total phosphorus (TP), ortho-phosphorus (OP), bacteria (fecal coliform and e-coli), nitrate-nitrite, turbidity, total suspended solids (TSS), instantaneous temperature, dissolved oxygen (DO), and percent (%) saturation (DO). Parameters will be monitored on an instantaneous basis with sampling occurring every two weeks.

Analysis of nitrogen, TP, OP, and TSS will be conducted by University of Idaho's lab. Bacteria analysis will be performed by Anatek Labs in Moscow. All other measurements will be performed by Cary Myler of the Idaho Association of Soil Conservation Districts (IASCD), or other personnel. Six sites have been chosen along Lindsay Creek to capture the best 'picture' of the watershed. The site locations are shown on the following map.

Program Objectives

IASCD will cooperate with the Nez Perce Soil and Water Conservation Districts and local land owners in an attempt to complete the following goals:

1. Evaluate the water quality and discharge rates at various locations within this creek and its tributaries.
2. Attempt to determine which areas contribute the greatest level of water quality exceedances.
3. Prioritize loading areas that may require BMP implementation or other possible management strategies.
4. Ascertain water quality and nutrient levels of contributing tributaries.
5. Determine correlation between turbidity and total suspended solids.
6. Make data available to the public.

Site Description:

These sites are shown on the map on page 2.

1. Site located near the mouth of Lindsay Creek within Odom Company's private park.
2. Site located near mouth of tributary, which parallels Gun Club Rd.
3. Site located below feedlot along Lindsay Creek Road.
4. Site located upstream of confluence with Lindsay Creek on the unknown tributary.
5. Site located upstream of confluence between Lindsay Creek and unknown tributary.
6. Site located on outlet of Mann Reservoir.

Sampling Methods

Water Quality

With the exception of bacteriological samples, each grab sample will be composited into a 2.5-gallon polyethylene churn sample splitter. The resultant composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. For samples requiring filtration (ortho-phosphorous), a portion of the sample water will be transferred into the filtration unit and pressure filtered through a 0.45 μm . GN-6 Gelman Metrical Filter. The resultant filtrate will be transferred directly into a properly prepared sample bottle. The filtration unit will be thoroughly rinsed with deionized water and equipped with a new 0.45 μm . filter at each sampling location. Water samples for nutrients that require preservation, will be transferred into preserved (H_2SO_4 pH <2) 500 ml. sample containers. The polyethylene churn splitter will be thoroughly rinsed with source water at each location prior to sample collection.

Bacteriological samples will be collected directly from the mid-stream discharge into properly prepared sterile sample bottles

Bacteria samples will be monitored for fecal coliform and *Escherichia coli* (*E. coli*) bacteria on Lindsay Creek. The samples will be shipped to Anatek Labs in Spokane, Washington for analysis. Refer to Table 1 for a list of parameters, analytical methods, preservation, and holding times.

All sample containers will be equipped with sample labels that will be filled out using water proof markers with the following information: station location, sample identification, date of collection, and time of collection. Clear packing tape will be wrapped around each sample bottle and its label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed within a cooler, on ice, to await shipment to the laboratory. Chain-of-Custody forms will accompany each sample shipment. All samples, except bacteria, will be shipped to the University of Idaho Analytical Sciences Laboratory Moscow, Idaho for analyses. Bacteria samples will be sent to Anatek Labs in Spokane for analysis. Samples will be shipped either the same day or early the next morning to meet 30-hour holding time.

Table 1 Water Quality Parameters

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	200 ml	Cool 4°C	7 Days	EPA 160.2
Nitrogen-nitrate/nitrite	50 ml	Cool 4°C, H ₂ SO ₄ pH < 2	28 Days	EPA 353.2
Total Phosphorus	100 ml	Cool 4°C, H ₂ SO ₄ pH < 2	28 Days	EPA 365.4
Ortho Phosphorus	100 ml	Filtered , Cool 4°C	24 Hours	EPA 365.2
Fecal Coliform	250 ml	Cool 4°C	30 Hours	SM9221
<i>Escherichia coli</i>	250 ml	Cool 4°C	30 Hours	MPN

Field Measurements

At each location, field parameters for dissolved oxygen, specific conductance, pH, temperature and total dissolved solids will be measured. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacturer's specifications. Refer to Table 2 for a listing of field measurements, equipment and calibration techniques.

Table 2 Field Measurements

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55 StowAway temperature logger Model XTI 02	Centigrade thermometer Centigrade thermometer
Conductance & TDS	Orion Model 115	Conductance standards
PH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity
Turbidity	Hach Model 2100P	Formazin Primary Standard

All field measurements will be recorded in a bound log book along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site or any problems observed that may affect the quality of data.

Flow Measurements

Flow measurements will be collected by wading and using a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. For depths greater than three feet the two-point method (0.2 and 0.8 of the total depth below the water surface) will be employed. At each gauging station, a transect line will be established across the width of the drain/creek at an angle perpendicular to the flow. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second at each of the monitoring stations.

Quality Assurance and Quality Control (QA/QC)

The University of Idaho Analytical Service Laboratory (ASL) utilizes methods approved and validated by EPA. A method validation process, including precision and accuracy performance evaluations and method detection limit studies, are required of all of ASL Standard Methods. Method performance evaluations include quality control samples, analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are all part of ASL's quality assurance program. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field-sampling portion of this project will consist of duplicates (at 10% of the sample load) along with blank samples (one set per sampling event). The field blanks will consist of laboratory-grade deionized water, transported to the field and poured off into a prepared sample container. The dissolved phosphorous blank will be collected by filtering deionized water through the filtration unit and transferring the resultant filtrate into an appropriate sample container. The blank sample is used to determine the integrity of the field teams handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate and blank samples will not be identified as such and will enter the laboratories blindly for analyses. Both the duplicates and blank samples will be stored and handled with the normal sample load for shipment to the laboratory.

Water samples for bacteria will be shipped to Anatek Labs. Their procedures use MPN (most probable number) by multiple tube fermentation to determine fecal coliform levels in the water sample. Anatek Labs is certified by the state of Washington to conduct laboratory analysis including bacteria.

Data Handling

All of the field data and analytical data generated from each survey will be submitted to ISDA for review. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements, and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will

be investigated and resolved, if possible. The data will then be stored electronically and made available to any interested entity.

Data use

The data generated from this monitoring program will be used by IASCD, SCC, and the NPSWCD to determine loads within the stream, identify areas where BMP's would have the greatest benefit, provide baseline data prior to TMDL development, and identify changes as BMP's are implemented. Data will also be available to other agencies and the general public.

Lindsay Creek Watershed Landuses



-  Lakes
-  Streams
-  Roads

Landuses

-  Dryland Agriculture (9,863 acres)
-  Urban (3,500 acres)

 Sample sites

2 0 2 4 Miles

